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INVENTION PATENT

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Improvements to construction beams.

Holder: the company, H. NEWSUM SONS & COMPANY LIMITED, residing in Great Britain.

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Priority:

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The invention concerns improvements to or involving construction beams, and among other things concerns a new or improved construction beam.

Beams according to the invention may be made either of wood or of plastic materials, or partly or entirely of metal.

The beams in question are preferably made of wood or plastic materials, such that their weight is markedly less than their load characteristics. The term "beam" used in this description comprises not only main beams, but also cross beams, and beams on a vertical axis (columns).

The invention concerns a construction beam composed of a central component or core, two lengthwise components joined with the lengthwise edges of the core, and support components spaced lengthwise along the beam and joined on the one hand to the lateral surface or lateral surfaces of the core and on the other hand to the lateral surfaces of the lengthwise components that extend on either side of the core.

In its most simple embodiment, the beam according to the invention is composed of a single central component (core) positioned between two lengthwise components to which the core is joined (the edges of the core fit into grooves cut into the surfaces of the lengthwise components). The support components are attached, on the one hand, to two lateral surfaces of the core, and on the other hand, to the surfaces of the lengthwise components that extend on either side of the core. The said support components consist, on the one hand, of a piece attached to the lateral surface of the core and, on the other hand, of a piece attached to the lateral faces of the lengthwise components, while the pieces that keep the first two pieces spaced apart thereby create an abutment that considerably strengthens the core and the lengthwise components, while

at the same time increasing their resistance. If needed, the abutment may be arranged in the inverse position, in other words the piece that normally is in contact with the core is somewhat distant from it while remaining parallel to it. This way, the piece in question constitutes a wall of the beam to which other construction components may be attached.

The invention also concerns a pair of beams (double beams) composed of two cores kept a certain distance from one another by two pairs of lengthwise components so as to form a hollow beam ("box beam"). In this mode of embodiment, the support components may be attached either to the outer surfaces of the hollow beam or to the inner surfaces, or to both at once. The basic components, which is to say the core, the two lengthwise components, and the support components, allow for many combinations of beams. If necessary, two pairs of lengthwise components may be assembled together, with one component per pair being joined to the core. It is also possible to make a beam of three parallel cores all three of which are provided with a lengthwise component attached to the edge of the core, and support components, with some of them running from the two outer cores to the central core, while others run from the central core to the outer ones.

The cores of the beams according to the invention are preferably made of laminated materials, such as laminated wood, or a sandwich comprising two outer sheets and an insert composed, for instance, of duly joined lengthwise components (such as sheets of wood glued together).

According to the invention, the end of a beam may also be securely attached at a right angle to another beam, by eliminating part of the two lengthwise components and positioning the core of one of the beams between the lengthwise components of the other beam, with the cores of the two beams being perpendicular to one another. In this case, the support components may be used to join the two beams in question and to permit further assembly. The result is easier roofing or any sized flooring construction using beams made according to the invention.

If one beam according to the invention is placed along the edge of a roof, edging may be attached to the edges of the lengthwise components without requiring any additional support.

Beams of any shapes and sizes may be built from prefabricated components. The support components may be made of materials that are milled or formed using the appropriate machinery, assembled into templates and stored ready to form into beams.

The core and lengthwise components can also be prefabricated into any desired lengths. Longer beams can then be made by assembling lengthwise components, butt-joining the cores and covering the butts with a support component.

If necessary, the core made be made of a laminated material cut lengthwise into steps, the two pieces then being separated and the steps placed face to face. This process makes it possible to increase by one-third the working width of a beam without increasing the weight. The core

constructed according to this process will have hexagonal hollows at regular intervals, so that there will be practically no reduction in the mechanical resistance of the piece.

The invention also provides for the use of an additional reinforcement piece inside hollow beams, with such a device consisting of a curved piece attached by its the two ends to the lower surface of the beam, and curved in such a way that its center rests against the upper surface of the beam. The said curved piece is preferably attached to the inside of the beam by means of screws attached to its lower surface, or by nailing it and reinforcing it with glue. The curved piece in question is preferably composed of a certain number of sheets joined together, by gluing for example, and is curved in an arc during its construction.

The length of beams constructed according to the invention may be calculated in function of the loads they are to support. In the construction of roofs, floors, ceilings, etc., a certain number of beams will be placed parallel to one another and spaced by means of crosspieces attached to the rectangular components, resulting in a surface to which the flooring itself or the roofing, will be attached.

The invention also provides for running conduits inside hollow beams. Such conduits will preferably be located above the laminated curved piece, if such a reinforcing device is provided inside the beam. In roofing construction, they may be used for rain water run-off. In the case of a flat roof, the water collected in a channel provided for that purpose in the center of the roof may run into a conduit inside the beam by means of a special pipe, and then be drained by the gutters or downspouts attached to the building. A beam according to the invention may also be placed so that its core is practically horizontal, with its lower surface being reinforced by the support components. A horizontal beam may also be placed at the bottom of a depression between two slopes of a roof and covered with tar paper or lead to form a gutter for rain water run-off. The conduit may also be used to house electrical cables or pipes for plumbing, gas, etc.

The description of the invention is illustrated in the attached drawings, where:

Figure 1 gives a side view of a beam constructed according to the invention;

Figure 2 is a cross section of the beam from figure 1;

Figure 3 gives a side view of a beam equipped with a laminated curved piece;

Figure 4 is a cross section of the beam from figure 3;

Figure 5 illustrates a cross section of another mode of embodiment of beams according to the invention;

Figure 6 is a cross section of two beams used in roofing construction;

Figure 7 gives a detailed view of the construction of a roof edging and soffit [intrados];

Figure 8 gives a partial cross section of a side elevation of a variant beam according to the invention;

Figure 9 gives an assembly detail;

Figures 10 and 11 give other assembly details;

Figure 12 is a partial cross section of a beam equipped with a laminated curved reinforcement piece;

Figure 13 is an overhead view showing the assembly of two beams used in the construction of roofing or flooring, with local loads;

Figure 14 is a perspective view of part of a simple beam;

Figure 15 is a cross section of another mode of embodiment of a hollow beam;

Figure 16 is a cross section of a construction composed of two beams with different shapes;

Figure 17 gives an overhead view of part of the construction illustrated in figure 16;

Figure 18 illustrates a cross section of another mode of embodiment of the construction;

Figure 19 illustrates a cross section of a skylight built by means of beams according to the invention;

Figure 20 is a cross section of another mode of embodiment of a beam according to the invention;

Figure 21 is a cross section of a hollow beam with three cores;

Figure 22 is a cross section of two beams joined at a right angle;

Figure 23 is a perspective view of a beam provided with support pieces;

Figure 24 shows another mode of embodiment of a hollow beam with a laminated curved piece, and equipped with conduit placed inside the beam;

Figure 25 gives a side elevation of the beam illustrated in figure 24;

Figure 26 is a cross section view of a gutter formed of beams according to the invention;

Figure 27 is a cross section of a beam made with a core made according to another mode of embodiment.

Referring first of all to figures 1 and 2, we see two practically horizontal components 1 with a practically rectangular cross section, equipped with mortises and tenons along their side edges, as well as a groove along one of their side faces. It is in this groove that core 5 is attached. Laths 2, attached to the side faces of the core at regular intervals, serve to connect the core to support components 3, which are held in place in relation to laths 2 by means of gussets 4.

The devices formed by laths 2, support components 3, and gussets 4 shall be referred to hereinafter as "reinforcement parts."

The reinforcement parts are preferably prefabricated and attached to two faces of the core at regular intervals of 2' on center, or a fraction of that measurement.

Figure 2 illustrates a cross section of a simple beam constructed according to the invention. Beams of this type can be used either as uprights in bays for windows, doors, openings, etc., as pillars, or as floor, ceiling, or roof beams, etc. A certain number of beams will

then be placed parallel to one another and kept in place by crosspieces 11, the edges of which are provided with mortises and tenons so that they may be assembled to lengthwise components 1, the side edges of which are also provided with mortises and tenons.

Figure 3 and 4 illustrate another mode of embodiment of the invention: a beam composed of a pair of cores 5, and two lengthwise components 1 assembled by mortise and tenon, with the unit forming a hollow beam ("box beam").

The reinforcement parts are attached to the outer faces of cores 5, and crosspieces 11 may be provided so as to be perpendicular to the length of the beams for attaching them to adjacent beams.

Inside the hollow beam is laminated curved piece 6 attached by pieces 7 to the two ends of the bottom of the inner chamber of the beam and arranged so as to touch the ceiling of the said chamber at its midpoint. Curved piece 6 preferably has a laminated structure, particularly if it is made of wood, which would however not prevent it from being constructed of a single piece, particularly if it is made of plastic.

To increase the strength of a beam such as the one illustrated in figure 5, the latter may be composed of three lengthwise components 9, having generally the same shape as abovementioned lengthwise components 1, and accompanied by another lengthwise component 10, positioned between said lengthwise components 9. Two cores 5 fit into the grooves cut into the side surfaces of lengthwise components 9, while the reinforcement parts (see description above) are attached to the side faces of cores 5 in question. A laminated curved piece is then placed in the beam, attached by its two ends to the latter's base and supported by two pieces 21 attached to the base of the beam and having a length that varies in relation to the length of the curved piece.

Laminated curved piece 6 is attached to the interior of the beam by both gluing and by nails driven through cores 5 and support piece 21. Facing 8 is then attached to components 9. As a result of the load characteristics of an arc, it is possible to support a considerably greater load, particularly at the middle of a beam that makes use of curved piece 6.

A third core may be provided to reinforce the beam at points subject to greater stress, and facing 8 is then applied to the upper surface of the beams.

Figure 6 illustrates two beams spaced by crosspieces 11 and equipped with facing 8.

Figure 7 shows two beams joined at a right angle to form a support, attached to which are closing pieces 14 carrying edging 13, while one practically horizontal beam 5 forms a masked gutter to which soffit 16 is attached. Horizontal beam 5 may be covered with roofing paper or any other waterproof material so as to form a gutter. Terminal beam 15 on the building was provided for that purpose.

Figure 8 shows another mode of embodiment of the device in figure 5: the upper surface of laminated curved piece 6 carries conduit 17 which is accessible by means of opening 26 provided in the center of the beam. It would be useful for opening 26 to be in the form of a spout through which rain water will run in the conduit inside the beam. Said conduit 17 opens into a channel or collecting conduit to permit water run-off. It is recommended that linings 22 be provided on the upper surface of the beam to drain the water towards opening 26.

Figure 9 is a detailed illustration of the assembly system for lengthwise components 1 and 9.

The joining surfaces of components 1 and 9 are preferably provided with shoulder 27. The oblique sections of the two pieces to be joined are glued together and the joint is reinforced with nails or screws. It is recommended that the angle of the surfaces to be joined not be less than 1/10.

Cores 5 may be made of a solid laminated material. According to another mode of embodiment, a sheet of material to be used for the core may be cut along line 19 as indicated in figure 10; the two halves so formed are then separated and glued together so as to form a hollow piece with an internal hexagonal cross section (see No. 20 in figure 11). This appreciably increases the width of the beam in question while significantly reducing its weight, without any noticeable loss of strength.

The beams can be any length whatsoever, which can vary according to the most diverse applications. However, the simple beam illustrated in figure 2 preferably has a length of 10 to 20', while the length of the beam illustrated in figure 4 may range from 20 to 35'. In some cases, the length of the beam illustrated in that figure may be as high as 60 to 65'.

The assembly of components 1 and components 9 may be done according to the system illustrated in figure 9. Cores 5 are joined end to end, and the butt joints are preferably covered by laths 2 of a reinforcement part.

Laminated curved pieces 6 may be made of one or two pieces, or even of six sheets of wood if greater strength is required. Cores 5 are preferably made of laminated wood and the other components of the beam will be made of first quality wood. Beams may be partly or entirely made of materials other than wood, such as synthetic materials or metal. If they are made of synthetic material, it is recommended that a thermoplastic material be used, such as a melamine plastic or casein-based products.

All components 1 and 9 are mortised and tenoned along the sides and have a groove cut into one of their faces. The result is that components 1 and 9 in question are interchangeable and can be used to construct any type of beam according to the invention. The height of beams 5 will vary depending on the load and the function of the beam. Cores are, however, preferably cut into 8' sections.

The manufacturing processes do not significantly simplify the construction of the beams according to the invention, although they do permit a notable reduction in sale price.

Lengthwise components 1, as well as components 2 and 3, are made of the same material; they are provided with mortises and tenons along their lengthwise sides, and with a groove on one of their faces. The material used is then cut to the appropriate length, for constructing either the lengthwise components or the reinforcement parts.

Figure 14 gives a perspective view of a simple beam according to the invention: we see here the arrangement of the reinforcement parts made up of pieces 2 and 3 and of gussets 4.

A hollow beam may be made of a simple beam provided with short crosspieces 11 that fit into the mortises and tenons on lengthwise components 1. Facing 30 then constitutes the side walls of the beam (see figure 15).

In the construction of floors, ceilings or roofs, it is often useful to provide additional reinforcements at certain points. To that end, two beams may be placed side by side, with reinforcement parts 3 extending into the adjacent beams so as to form a hollow beam that is joined so as to be parallel to a simple beam as illustrated in figure 16. Figure 17 is an overhead view of the left section of the beams illustrated in figure 16. If necessary, the reinforcement parts may be made so as to have one piece 31 in common with two opposite reinforcement pieces 2, while the latter are equipped with gussets 4 placed between pieces 2 and pieces 31, to join the two beams in question (see fig. 18).

In the construction of openings for skylights, doors, etc., a beam may be mounted along the opening in question with a certain number of reinforcement parts mounted on the back and fitting into the lower faces of lengthwise components 1 of the beam, and facing 32 is attached to the reinforcement parts to form the side wall of the beam. Skylight 34 can then be placed on top of the beam and attached to reinforcement part 33 (see figure 19).

If one wishes to increase the strength of a beam while maintaining its width, it is entirely possible to provide the beam with additional lengthwise components 1a applied to lengthwise components 1 (see figure 20).

Figure 21 illustrates a particularly solid hollow beam, composed of three cores 5 and lengthwise components 1 attached to one another (mortise and tenon joints). Facing 8 can then be attached to the upper and/or lower surfaces of lengthwise components 1.

Two beams may be joined together at a right angle, as shown in figure 22. One beam composed of one core 5 and one lengthwise component 1 is joined at a right angle to another beam composed of core 5a and lengthwise components 1a. The end of lengthwise component 1a is cut so that core 5a can extend under lengthwise components 1 to meet core 5. One reinforcement part composed of parts 3 and gussets 4 is placed on the side opposite beam 1 and

core 5, and another reinforcement part composed of parts 2a and 3a and of cores 4a is attached at a right angle so as to belong simultaneously to beams 1-5 and 1a-5a.

The reinforcement parts can either be provided with component 2 that faces the core, or they can be on the back, as shown in figure 23. In the latter case, component 2 constitutes a surface to which a soffit or any other facing may easily be attached.

In the construction of a hollow beam provided with laminated curved piece 6, it is possible to place conduit 38 on top of the said curved piece and to provide pipe 36 for rain water to run off from the roof to the conduit, from which it is drained through downspouts or eliminated. A beam according to the invention can also be placed at the bottom of a depression between two slopes of a roof and serve as a masked gutter. Figure 26 illustrates a variant embodiment of a beam, whether masked or not: one beam composed of core 5 is provided with reinforcement parts on one side only, and placed so that its core is practically horizontal and adjacent to beams with vertical cores. Core 5, as well as side pieces 38 and 39, which form a chamfered joint with lengthwise components 1 of the adjacent beams, may be covered with a waterproof material.

If necessary, core 5 may be replaced by a compound core composed of a pair of cores 5, placed between which are lengthwise components 1, which themselves may be accompanied by core 41 attached to their grooves, so that the tenons in components 1 fit into the mortises cut into the faces of lengthwise components 1 at the top and the bottom of the beam, as shown in figure 27.

If beams according to the invention are used in a vertical position as pillars for outer walls, common walls, or prefabricated construction, etc., rectangular components 1 may serve as uprights for windows, doors, etc. It is also possible for at least one of the lengthwise components to be made of the appropriate hardwood and that some of the lengthwise components may be used as sheathing between columns formed by the beams, thereby forming a hardwood facade without detracting from either the strength or the effectiveness of the devices in question. Walls of this type may be decorated with different ornamental moldings. Pillars of this kind are very useful in the construction of weight-bearing or non-weight-bearing walls. All components may be easily joined together and waterproofed.

We note that ceiling panels may be previously attached to the units, to crosspieces 11, as well as to lengthwise components 1, which serve as components to which the tiles or panels are attached. Units of any shape and size may be prefabricated and delivered to the work site ready for assembly.

It is preferable that all components and beams according to the invention be made of wood or any other materials that are duly fire-proofed, fungus-proofed, and germ-proofed, etc.

We note that chlorinated rubber paints are particularly suitable for protecting wooden beams.

All joints between components are glued with glues that are free of any risk of deterioration, such as resorcinol-based glues.

It must be stressed that this invention concerns the simplest and most effective process for constructing wooden beams at a relatively low cost, and employs a very restricted number of different components that are practically all interchangeable, making it possible to build beams that can be used in the most varied applications.

Beams according to the invention also have the advantage of permitting the use of several modern construction methods, such as the construction of masked gutters, etc.

In addition, the invention makes it possible to produce construction beams at sale prices that are markedly lower than those of other wooden or metal beams while offering broader possibilities as regards the design, execution, etc., of the work. These beams, moreover, have a relatively reduced weight while retaining sufficient strength to serve as both a pillar and as an overhang piece. The beams in question are relatively easy to make and, thanks to their reduced weight, easy to transport.

The beams according to the invention may be made in standard dimensions or variable dimensions on demand.

ABSTRACT

The invention concerns a construction beam characterized in that it is composed of a central component or core, a pair of lengthwise components joined to the edges of the core, and support components spaced lengthwise along the beam and joined on the one hand to the lateral surface or lateral surfaces of the core and on the other hand to the lateral surfaces of the rectangular components that extend on either side of the core.

The beam may also have the following arrangements or characteristics, considered together or separately:

a. It may consist of a pair of parallel cores and support components common to each core and its lengthwise components;

b. It may consist of three cores, with the middle one provided with support components common to the two outer cores and the lengthwise components associated with them;

c. It may be provided with a facing attached to the projecting edges of the lengthwise components so as to form a hollow beam;

d. It may have support components comprising a first piece whose widest face is parallel to the core, and two other pieces placed so that each is parallel to the two ends of the first piece

and perpendicular to the latter, as well as gussets joined to the first piece and the two other pieces between them;

e. In the arrangement under d, the first of the aforesaid support components may be applied with its face against the core;

f. In the arrangement under d, the first of the aforesaid support components may be positioned a certain distance from the core;

g. It may be provided with a second lengthwise component the face of which is applied against at least one of the two lengthwise components attached to the lengthwise edges of the core;

h. Its lengthwise components may be composed of lengthwise pieces with a practically rectangular section and joined on the bias;

i. The core may consist of pieces joined end to end, with the butt joints covered with a support component;

j. The lengthwise components may be provided with a tenon along one lengthwise edge, and a mortise along the opposite edge, and a groove on one of their faces;

k. The first and two other support components mentioned above may be made of a material identical to that of the lengthwise components;

l. Many beams having all or some of the characteristic arrangements under a to k may be joined by means of crosspieces arranged transversely in relation to the lengthwise components and attached to them;

m. The core may be composed of one or more pairs of practically identical pieces, having one straight lengthwise side for attaching to a lengthwise component, and one side cut in a zigzag, with the two pieces of a pair being practically symmetrical to one another so as to form a hollow component (hollow core) when placed side by side;

n. A beam may be composed of at least two parallel cores according to the characteristics under a to m, and provided with an arc-shaped curved piece, attached, on the one hand, by its two ends to one of the lengthwise components, and on the other hand, to the center of another lengthwise component;

o. A beam according to the invention under n, in which the arc-shaped curved piece is composed of plywood (laminated piece);

p. A beam according to the arrangements under n or o in which the curved piece is attached to the inside of the beam by support pieces attached to one or several lengthwise components;

q. A beam according to the arrangements under a to p, equipped with a conduit placed inside the beam and being used for rain water run-off or for other purposes;

The invention also concerns a construction process that implements the beams according to the above arrangements.

Likewise, the invention concerns the system for joining two beams according to arrangements a, q at a right angle, in which part of the lengthwise components of one of the beams is eliminated so as to leave the core exposed, with the said exposed core being placed between the projecting surfaces of the lengthwise component on the other beam so that the two beams are practically perpendicular to one another, with the support components being positioned on either side of the first above-mentioned beam.

Finally, the invention also extends to the process of fabricating gutters in construction, characterized in that it comprises the arrangement of a beam according to characteristics a-q, at the edge of a surface on which water may run, with the core of the said beam being practically horizontal, the support components being positioned only on the lower surface of the said core, and the latter, as well as the adjacent surfaces, being covered with a waterproof material.

The company:
H. NEWSUM SONS & COMPANY LIMITED
Through the agent:
Tont-Durand Office

No. 1,271,556 The company: 6 plates - Plate I

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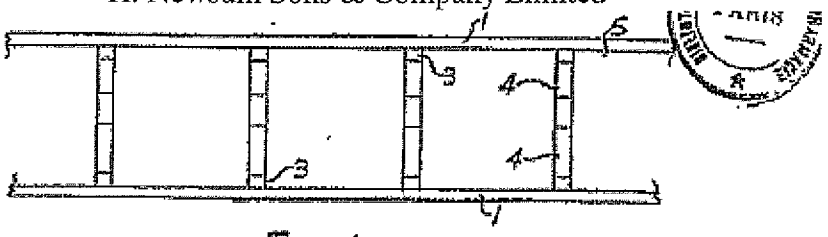

Fig. 1.

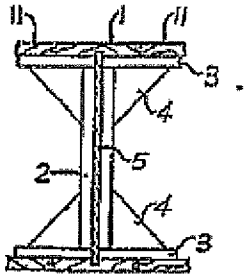

Fig. 2.

Fig. 3.

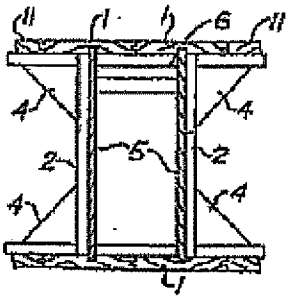

Fig. 4

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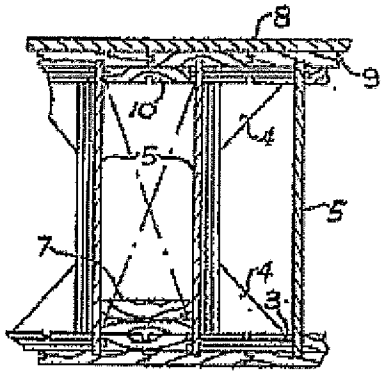

Fig. 5.

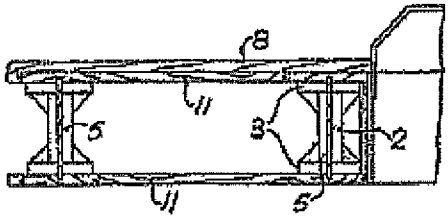

Fig. 6.

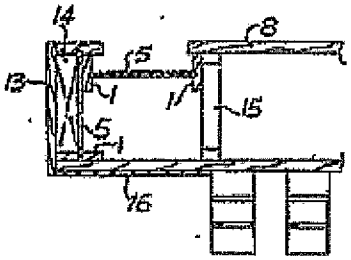

Fig. 7.

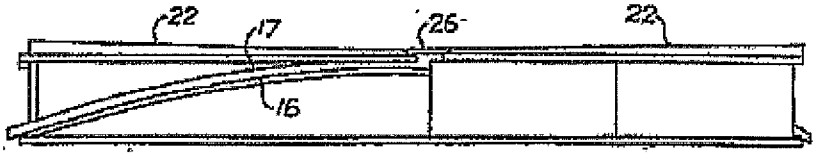

Fig. 8.

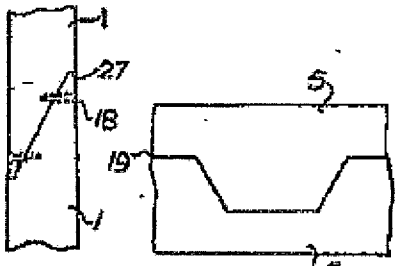

Fig 9. Fig. 10.

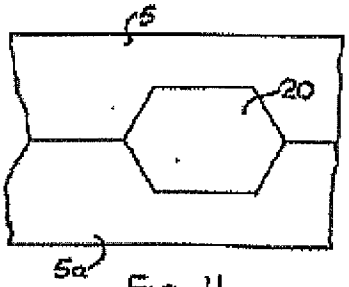

Fig. 11

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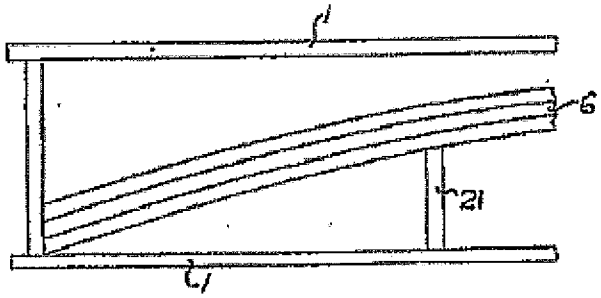

Fig. 12

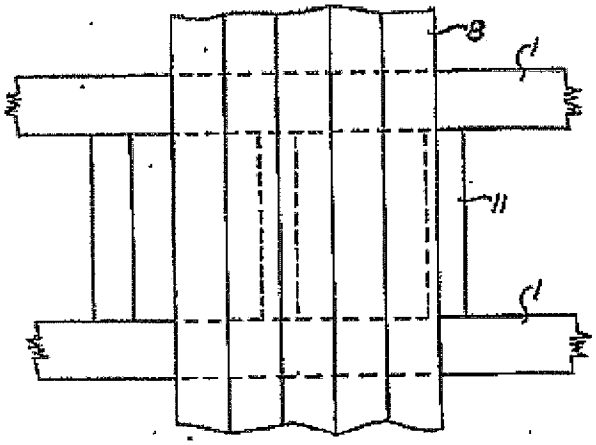

Fig. 13

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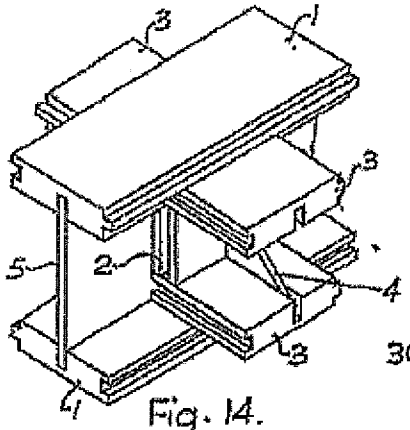

Fig. 14.

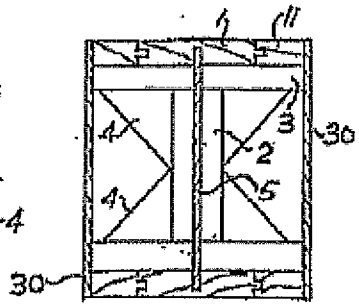

Fig. 15

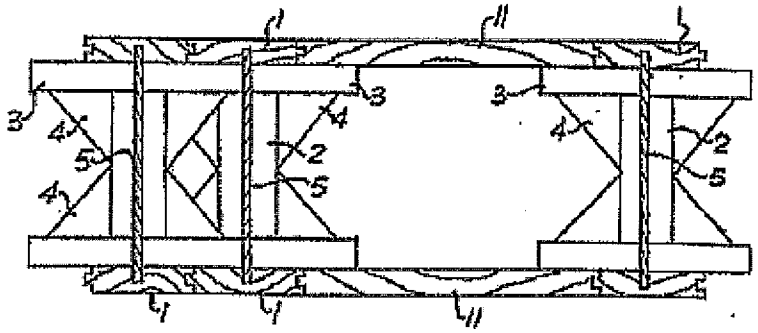

Fig. 16.

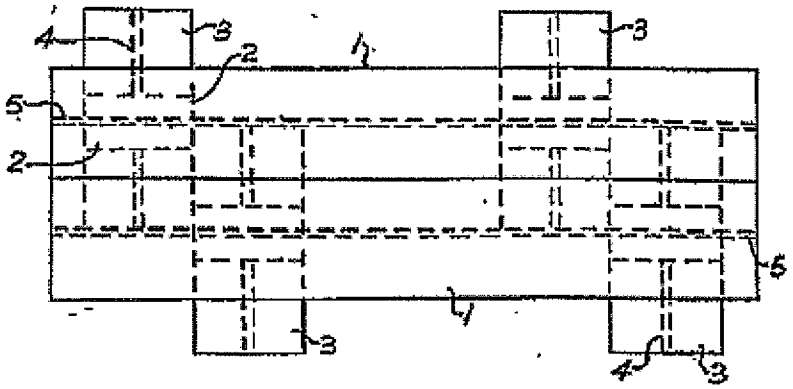

Fig. 17

No. 1,271,556 The company: 6 plates - Plate V

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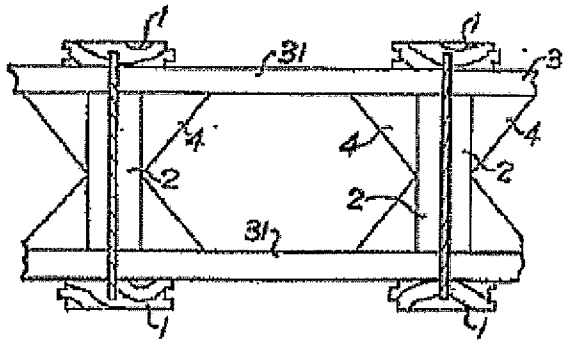


Fig 18

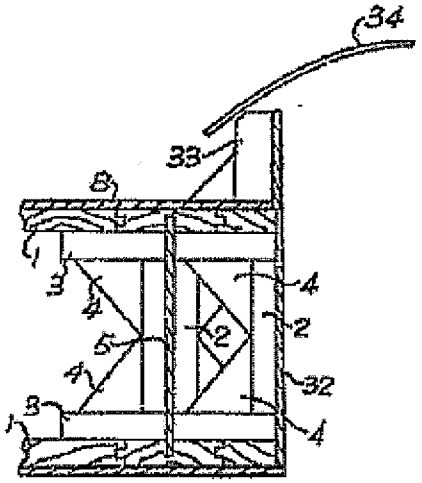


Fig. 19

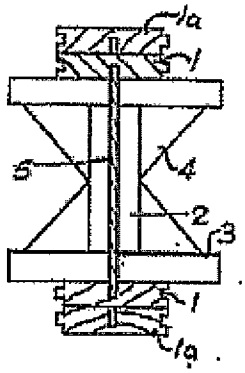


Fig. 20

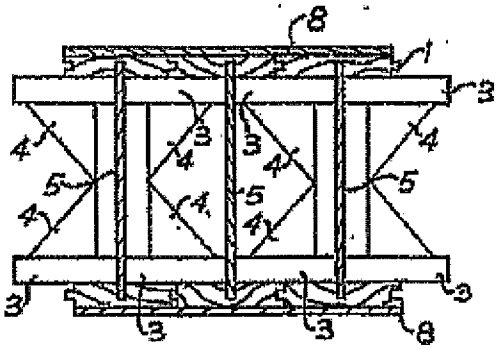


Fig. 21.

No. 1,271,556 The company: 6 plates - Plate VI

H. Newsum Sons & Company Limited

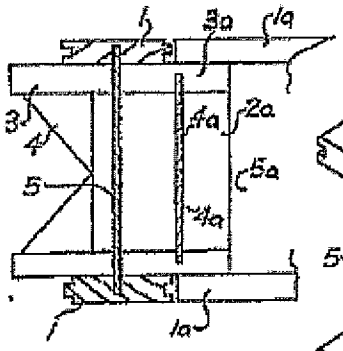
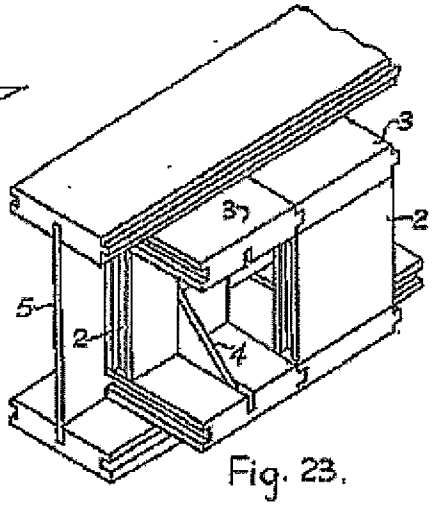


Fig 22.



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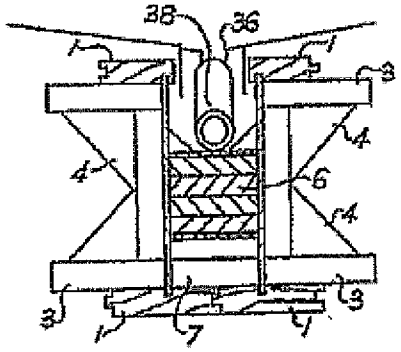

Fig 24

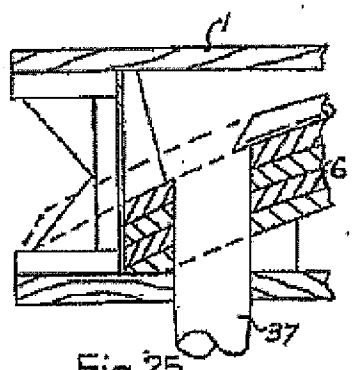

Fig 25.

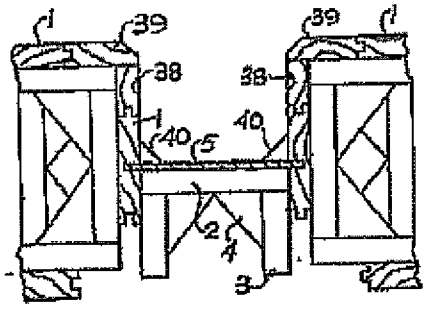

Fig. 26

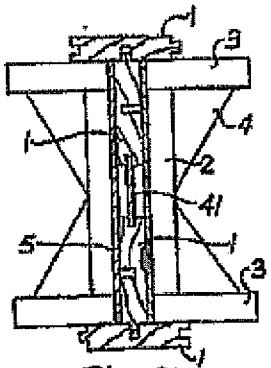

Fig 27

PHOENIX
TRANSLATIONS

...the height of EXCELLENCE...

Invention Patent
Record No. 833,665, Publication No. 1,271,556
Improvements To Construction Beams

Translated from French into English
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